



Disaster Planning and Hospital Hardening Lessons from Mercy Hospital - Joplin

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Conflict of Interest:

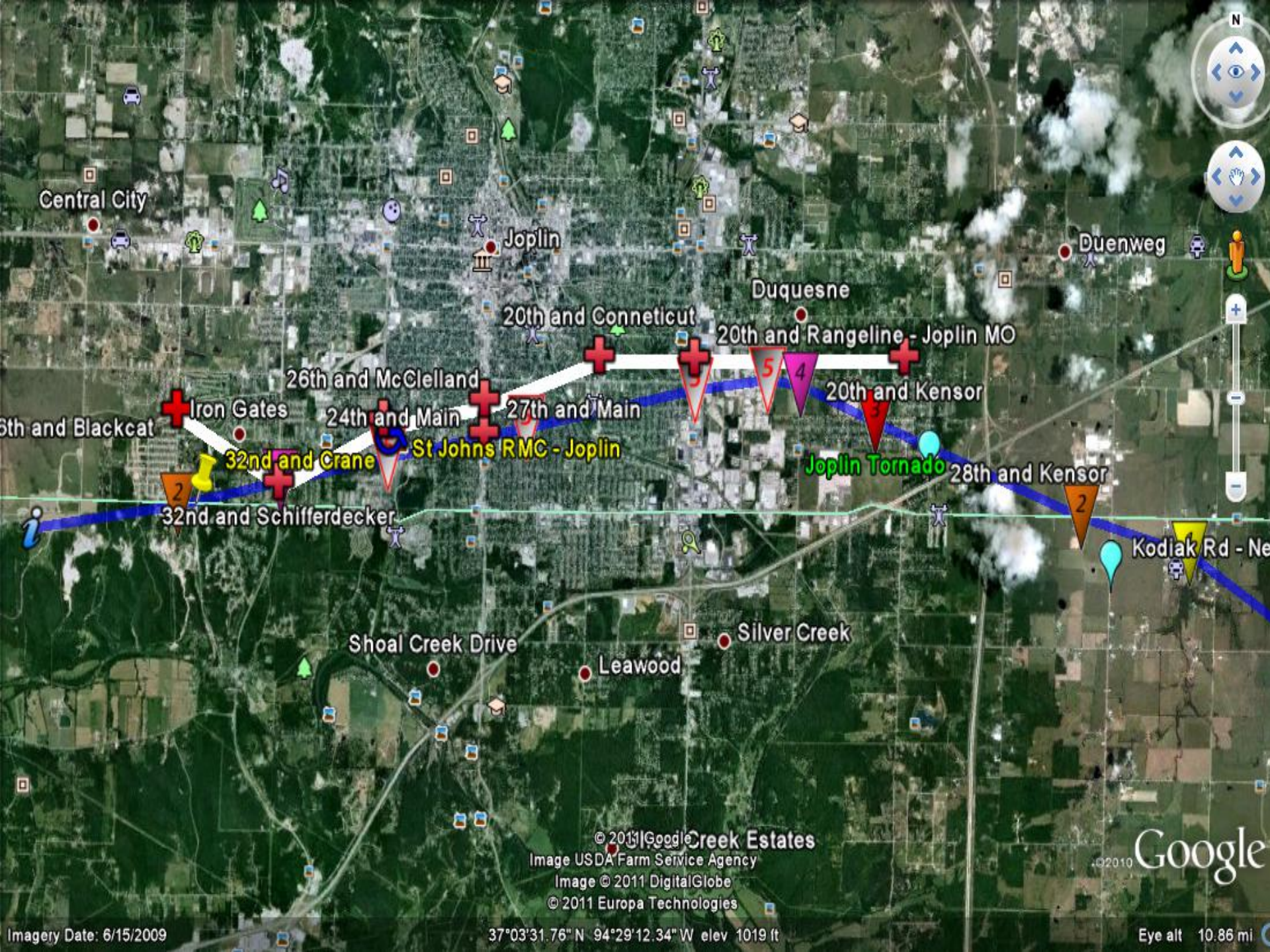
I have nothing to disclose.

Mercy-St. John's Regional Medical Center



TORNADO DAMAGE BY NUMBERS

- 161 deaths, thousands of injuries, single worst tornado strike since record-keeping began in the 1960's
- EF-5 Tornado, winds 250 mph, 1.5x22 miles
- 8,000 homes destroyed
- 400 businesses destroyed
- 4,500 jobs displaced
- 8 schools destroyed
- 3 nursing homes destroyed
- \$3.5 Billion dollars in damage, costliest ever



Central City

Joplin

Duquesne

Duenweg

20th and Connecticut

20th and Rangeline - Joplin MO

26th and McClelland

24th and Main

27th and Main

20th and Kensor

5th and Blackcat

Iron Gates

32nd and Crane

St Johns RMC - Joplin

Joplin Tornado

28th and Kensor

32nd and Schifferdecker

Kodiak Rd - Ne

Shoal Creek Drive

Silver Creek

Leawood

© 2011 Google Creek Estates

Image USDA Farm Service Agency

Image © 2011 DigitalGlobe

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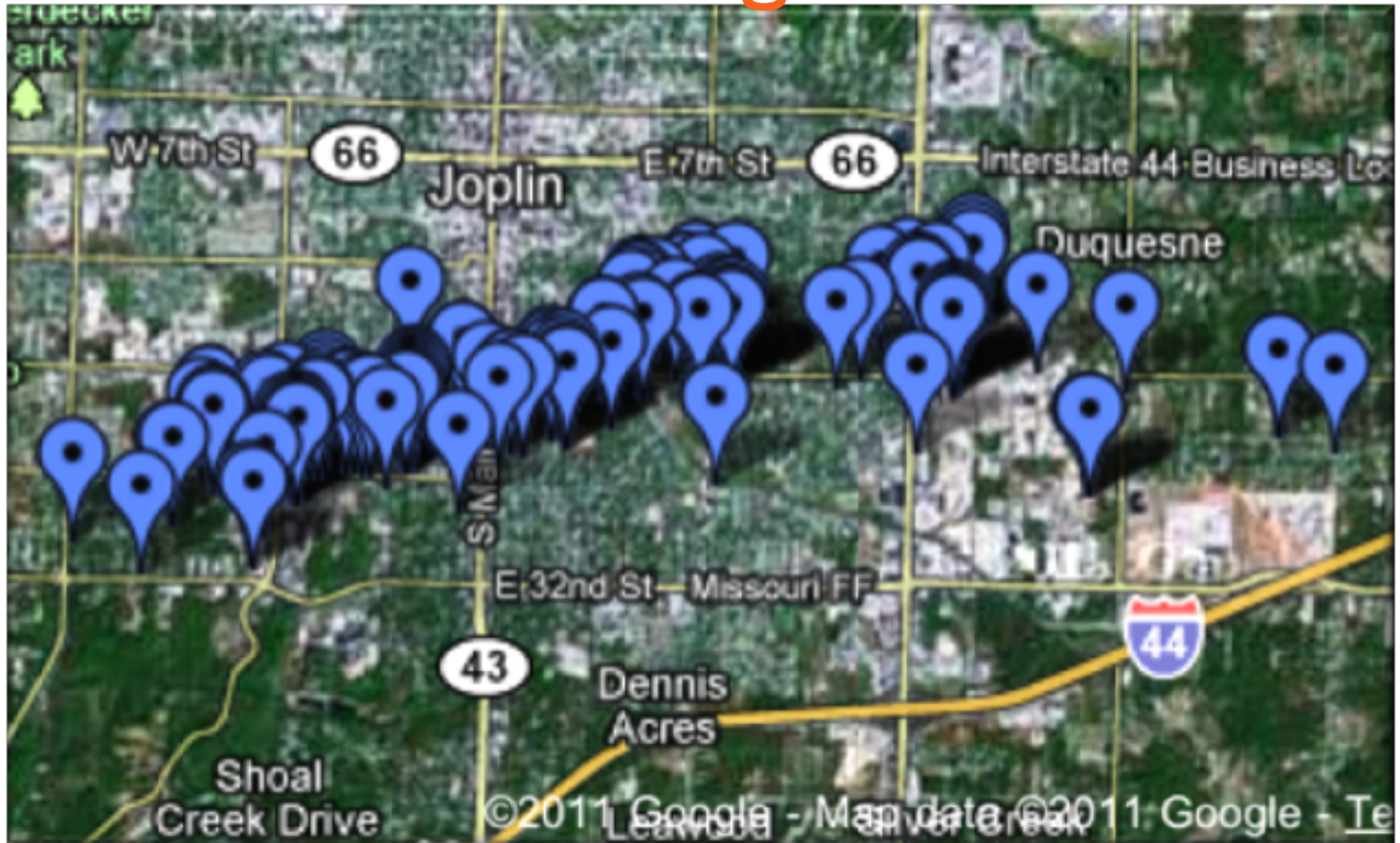
Google

Imagery Date: 6/15/2009

37°03'31.76" N 94°29'12.34" W elev 1019 ft

Eye alt 10.86 mi

Fatalities Along Tornado Path



On May 22, 2011, the Mercy/St. John's Regional Medical Center, a Level-II Trauma Center in Joplin took a direct hit by the EF-5 tornado.







St. John's ER









F-5 wind strength





Hospital lobby





Flying Debris



St. John's Site

- 183 pts – evacuated in less than 90 minutes
- 24 ED pts evacuated
- Triage/Treatment at site
- Transferred to other facilities:
 - ✓ Freeman – Joplin, MO
 - ✓ McCune Brooks – Carthage, MO
 - ✓ Mercy – Springfield, MO
 - ✓ Neosho, MO
 - ✓ Miami, OK
 - ✓ Pittsburg, KS
 - ✓ Rogers, AR
- Staff scavenged supplies – most walked to Memorial Hall- 3 miles
- Established mobile "hospital" within minutes
- 6 deaths in the hospital, 5 patients, 1 visitor
- As unfortunate as 6 deaths were, that building stood strong to save over 300 lives that evening when nothing else stood for miles

**The challenge was knowing
where to start**



Memorial Hall Temporary ED



First Challenge: A hospital open within a week of May 22





Modular Hospital Opened August 18, 2011



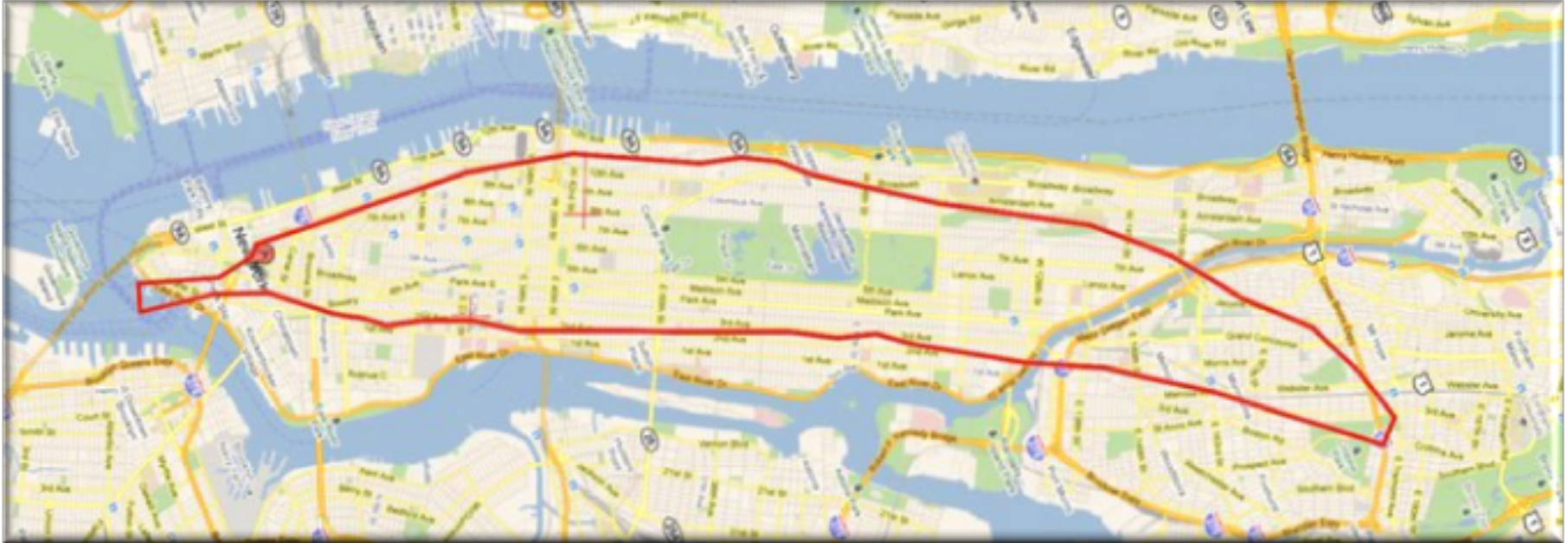
Mercy Component Hospital Opened April 15, 2012



Emergency Department Entrance



ARE YOU READY?



**Path of Joplin Tornado
Placed over Manhattan (to scale)**

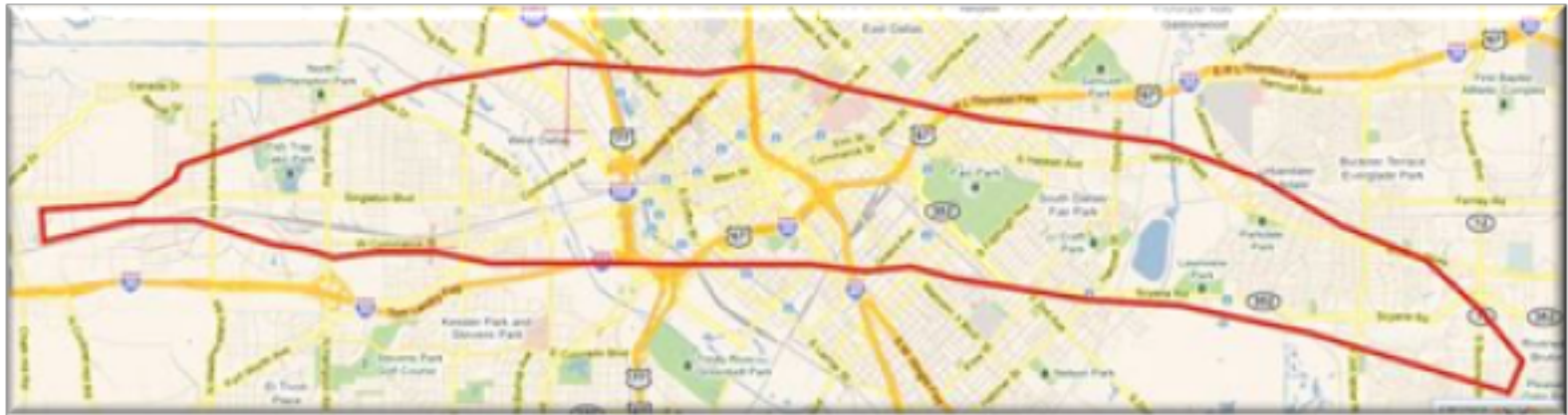
ARE YOU READY?



Path of Joplin Tornado Placed over OKC (to scale)

Overlay courtesy of Brennfoerder Architectural

ARE YOU READY?



**Path of Joplin Tornado
Placed over Dallas, TX (to scale)**

Disaster Planning

- 4 P's- Plan. Prepare. Practice. Pray.
 - ✓ Drill until you fail, re-evaluate, improve your plan
- Bunker System
 - ✓ Communications
 - ✓ Supplies
 - St. John's MCI trailer was destroyed
 - Have caches of supplies stored where you might need them
 - Medications
 - ROI
- Each person should have personal disaster kit for 96 hours of self sustainability: meds, clothing, water, food
- Lessons learned hand-out
- Take care of your staff, your best resource
 - ✓ Rest, Medications, their families, EAP, debriefing

Disaster Planning

- Know your contacts
 - ✓ Local, State, Fed
- Vital to have close relationships with neighboring agencies
- Triage & treatment areas far more efficient than transport in large MCI's
- Have established sites for alternate medical facilities/care
 - ✓ Example: Memorial Hall
 - ✓ Supplies
 - ✓ Medication



Disaster Planning

- A strong incident command is a must
 - ✓ Memorial Hall
 - ✓ City Hall
- Establish an outside liaison early on with the state to better track and dispatch outlying agencies and to track volunteers
- Training is vital
 - ✓ EMS
 - ✓ Hospital
 - ✓ Police Department
 - ✓ Fire Department



Disaster Planning

- Respond to disaster situations with name badge
 - ✓ Educate your staff and local agencies
- Security needs increase rapidly
- Make emergency supplies easy portable
- Grab bags at locations throughout the facility
 - ✓ Paper and pen to record where patients are transported
 - ✓ Gloves
 - ✓ Flashlights and batteries
 - ✓ Protective eye wear due to flying debris, even at evacuation
- Consider marking rooms that have been searched and evacuated

Disaster Planning

- Have brooms/snow shovels on each floor to clear path
- Add patient slippers/shoes to your weather plan
- When under storm watches, announce periodically to keep staff informed
 - ✓ Special attention to co-workers who have been in storms
- Keep disaster call lists available
 - ✓ Important numbers in cell phone
 - ✓ Advise staff to come in should phone lines be down
- Communication will be a big issue

Disaster Planning

- HIPAA and Compliance
 - ✓ Record recovery plans
 - ✓ Record responsibility
 - ✓ Record storage and retrieval
 - ✓ Partner with vendor prior to needing the service
- Recovery Plan
 - ✓ IT vital
 - ✓ Include physical recovery, cleaning, mold elimination, and freeze drying
- Know what your insurance coverage provides

Disaster Planning

- Paper vs. Electronic Records
- Importance of offsite backup
- EMR went live on May 1, 2011
- Previous EHR houses records from July 2005-April 2011
- HIM department functional 4 days post storm
- Had Epic EHR functional in field hospital
- Never doubt the benefits of an electronic record

The electronic health record was never down
ready to activate in the mobile field hospital



Disaster Planning- Communication

- Cell Phones were grid locked-
Texting and social media were the
only reliable forms of
communication
- Land lines were down South of 15th
street
- Local TV knocked off the air
- GPS?
- V-tac channels not utilized
- Channel surfing
- Older analog systems better than
digital
- Hand-held radios



EF 5 Tornado Impact on Hospital

- Direct hit
- Windows and walls blown out
- Portions of roof pulled off
- Building infrastructure severely damaged
 - ✓ Generators destroyed
 - ✓ All communications lost
 - ✓ Water, sprinkler, gas and sewer piped disrupted
 - ✓ Liquid Oxygen tanks damaged
 - ✓ Massive debris throughout the building

Storm Hardening of New Facility

➤ Durable Exterior Skin

- ✓ Precast concrete exterior
 - ✓ No metal panels
 - ✓ No plastered exteriors
- ✓ Poured concrete roof
 - ✓ No ballast
 - ✓ No metal decking
- ✓ Hurricane-grade entry doors
- ✓ Reinforced Penthouse
 - ✓ Designed for high impact/high wind
- ✓ Canopies and bollards to keep cars and debris from blowing into main entryways

Storm Hardening

- **High Performance Windows**
 - ✓ All windows safety laminated
 - ✓ All windows rated at greater than 140 mph
 - ✓ Critical and difficult to evacuate areas have windows rated at greater than 250 mph
- Special Hardening in ED, critical care areas, Lab, Radiology, so they can remain functional
- Hardened stairwells for safe evacuation
- Dual entry for fiber communication arrays
- Updated communications systems for weather alerts and post-disaster communication

Storm Hardening

➤ Protected Interiors

✓ Hallway Safe Zones

- Large metal storm doors on 2nd floor main plaza
- Heavy duty storm doors on rooms
- Reinforced walls
- Additional ceiling supports
- Ante room and storm doors at hallway ends

➤ Emergency Storage next to stairwells

➤ Battery powered lighting

Storm Hardening

➤ Power On!!

- ✓ Generator partially buried in reinforced concrete structure
- ✓ All fuel tanks buried – 96 hours of run time
- ✓ Two independent power feeds from different power stations
- ✓ All utilities connect to building via underground tunnel
- ✓ All critical care ventilator and bassinets on uninterrupted power sources that can function for 2 hours or more with main power disabled

➤ Two main water lines to feed the new facility



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Questions?

Thank you!